

PROCEEDINGS
OF THE
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ON THE NATURE OF THE TEETH IN CTENOID
SCALES.

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In the course of our examination of a number of ctenoid scales, we have come to the conclusion that the teeth arise through the modification of the apical ends of vertical circuli, i. e., circuli which in the apical region retain their primitive vertical position. It is not evident that they have anything to do with the radii. In very highly specialized ctenoid scales, such as those of *Distichodus* among the Characinidæ, or *Rhinogobius* among the Gobiidæ (these two genera, though so little related, have the same kind of apical teeth), the teeth form a separate fringe which appears to have no intimate connection with the rest of the scale. From the study of such as these, the true nature of the ctenoid feature could not be made out, but it is

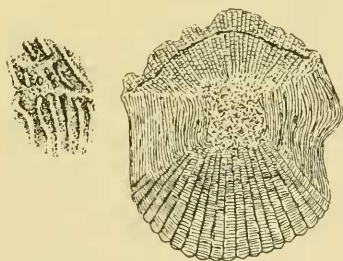


Fig. 1.

Scale of *Neomænis griseus*, showing at left,
connection of lateral with apical circuli.

admirably shown in the Characinid, *Citharidium ansorgii*, in which the comparatively few and remote teeth are seen to be continuations of vertical apical circuli, supplemented by the con-

vergence and coalescence of those immediately adjacent. The few genuine radii in this scale are between the teeth, and in the figure one is seen crossing the circuli obliquely.

The Lutianid, *Neomænis griseus* (L.), and the Hæmulid, *Aniso-*

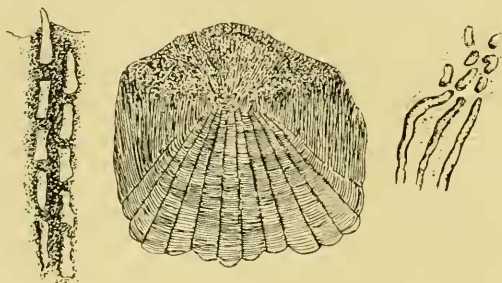


Fig. 2.

Scale of *Anisotremus virginicus*, showing connection of vertical circuli with teeth (left) and connection of lateral with apical circuli (right).

tremus virginicus (L.), (scales of both from Tampa, Florida, kindly sent by Dr. S. Graenicher) illustrate the same thing in a different way. The jointed lines radiating at the apex are not radii, but modified circuli. Their connection with the lateral circuli can be distinctly made out as is shown in our figures.

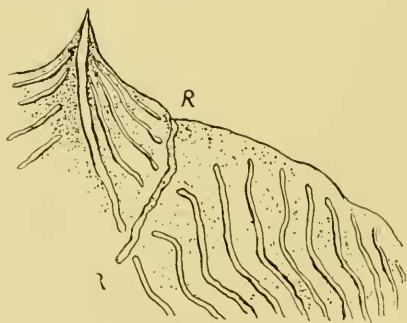


Fig. 3.

Portion of scale of *Citharidium ansorgii*, showing a lateral apical tooth, *R R* on radius, other markings circuli.

It follows from the above theory that a scale with completely transverse apical circuli, such as that of *Argyrosomus*, can not be and can not become ctenoid. The reason why there are no ctenoid Cyprinid scales seems to be, that the group has advanced

too far along the line of modification in regard to the circuli to be able to produce them. The more primitive Characinidæ, however, have been able to develop marginal teeth more than once, independently.

According to our view, a scale can not have marginal teeth, and *transverse* circuli running below them. Thus *Sebastodes* and *Pomotis* have scales with similar basal radii, and in many respects alike, but *Sebastodes* has vertical apical circuli, and is ctenoid, while *Pomotis* has them transverse and is absolutely cycloid.